

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (previously presented) A peptide nucleic acid conjugate comprising:
a backbone formed of amino alkyl amino acid monomeric units linked through amide bonds;
said backbone having an amino end, a carboxyl end, a plurality of said amino alkyl amino acid monomeric units, and a conjugate bound directly or through a linking moiety to at least one of said amino end or said carboxyl end;
each of said amino alkyl amino acid monomeric units having a tethered nucleobase;
and
said conjugate being a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, or a porphyrin.
- 2-4 (canceled)
5. (previously presented) A peptide nucleic acid conjugate comprising:
a backbone formed of amino alkyl amino acid monomeric units linked through amide bonds;
said backbone having an amino end, a carboxyl end, a plurality of said amino alkyl amino acid monomeric units,
each of said amino alkyl amino acid monomeric units having a tethered nucleobase;
and
a conjugate bound to one of said nucleobases or its said tether either directly or through a linking moiety, wherein said conjugate is a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal

chelator, a porphyrin, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers.

6-7 (canceled)

8. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein said conjugate includes a linking moiety.

9. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein at least one group R^{12} is a conjugate.

10. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein at least one of L and L_m is $R^{12}(R^{13})_1$ is a conjugate.

11. (canceled)

12. (previously presented) A peptide nucleic acid conjugate of claim 54 wherein at least one of said A- A_m groups include at least one of R^1 , R^2 , and R^3 .

13. (previously presented) A peptide nucleic acid conjugate of claim 54 wherein at least one of B- B_m groups or said G- G_m groups include at least one group R^3 .

14. (canceled)

15. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein at least one of said groups Q or I include at least one of groups R^8 , R^9 , R^{10} , and R^{11} .

16-19 (canceled)

20. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein m is from 1 to about 20.

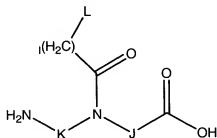
21-22 (canceled)

23. (previously presented) A peptide nucleic acid conjugate of claim 62 wherein R^{12} is a conjugate.

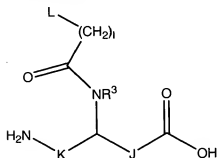
24. (previously presented) A peptide nucleic acid conjugate of claim 62 wherein a is 1.

25-29 (canceled)

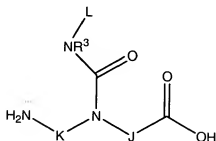
30. (previously presented) A peptide nucleic acid conjugate oligomer comprising a plurality of covalently linked PNA monomers wherein at least one of said PNA monomers has the formula:



or the formula



or the formula



wherein:

L is R¹²(R¹³)_a; wherein:

R¹² is hydrogen, hydroxy, (C₁-C₄)alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R¹² is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R¹³, if present, is a conjugate;

provided at least one R¹² and R¹³ is a conjugate; and

a is 0 or 1;

K is (CR⁶R⁷)_z;

J is (CR⁶R⁷)_y; wherein:

R⁶ and R⁷ are independently hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR³R⁴ and SR⁵ or R⁶ and R⁷ taken together complete an alicyclic or heterocyclic system;

R³ and R⁴ independently are hydrogen, a conjugate, (C₁-C₄) alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio or amino;

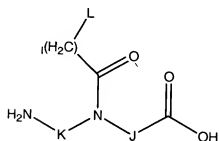
R⁵ is hydrogen, a conjugate, (C₁-C₆)alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C₁-C₆)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

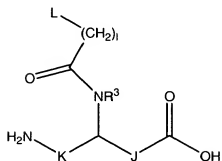
l is an integer from 1 to 5; and

at least one of L and R³ comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;
wherein said conjugate optionally includes a linking moiety.

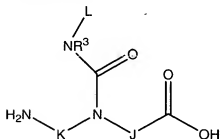
31. (original) A peptide nucleic acid conjugate of claim 30 wherein said conjugate includes a linking moiety.
32. (previously presented) A peptide nucleic acid conjugate of claim 30 wherein a is 1.
- 33-46 (canceled)
47. (previously presented) A peptide nucleic acid conjugate oligomer comprising a plurality of covalently linked PNA monomers wherein at least one of said PNA monomers has the formula:



or the formula



or the formula



wherein:

L is $R^{12}(R^{13})_a$; wherein:

R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

a is 0 or 1;

K is $(CR^6R^7)_z$;

J is $(CR^6R^7)_y$; wherein:

R^6 and R^7 are independently hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4) alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio or amino;

R^5 is hydrogen, a conjugate, (C_1-C_6) alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C_1-C_6) alkyl;

each of y and z is zero or an integer from 1 to 10, the sum $y + z$ being greater than 2 but not more than 10;

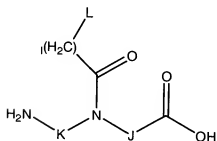
l is an integer from 1 to 5; and

at least one of L and R^3 comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;

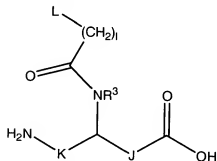
wherein said conjugate optionally includes a linking moiety; and

wherein at least one of R^3 , R^4 , R^5 , R^6 , and R^7 is a conjugate.

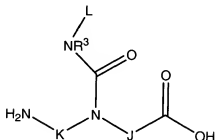
48. (previously presented) A peptide nucleic acid conjugate oligomer comprising a plurality of covalently linked PNA monomers wherein at least one of said PNA monomers has the formula:



or the formula



or the formula



wherein:

L is R¹²(R¹³)_a; wherein:

R¹² is hydrogen, hydroxy, (C₁-C₄)alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R¹² is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R¹³, if present, is a conjugate; and

a is 0 or 1;

K is (CR⁶R⁷)_z;

J is (CR⁶R⁷)_y; wherein:

R⁶ and R⁷ are independently hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR³R⁴ and SR⁵ or R⁶ and R⁷ taken together complete an alicyclic or heterocyclic system;

R³ and R⁴ independently are hydrogen, a conjugate, (C₁-C₄)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio or amino;

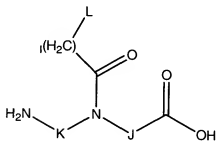
R⁵ is hydrogen, a conjugate, (C₁-C₆)alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C₁-C₆)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

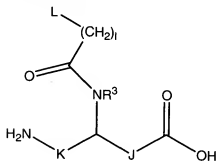
l is an integer from 1 to 5; and

at least one of L and R³ comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;
wherein said conjugate optionally includes a linking moiety; and
wherein at least one of said group K or said group J includes a conjugate.

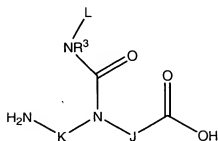
49. (previously presented) A peptide nucleic acid conjugate oligomer comprising a plurality of covalently linked PNA monomers wherein at least one of said PNA monomers has the formula:



or the formula



or the formula



wherein:

L is $R^{12}(R^{13})_a$; wherein:

R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

a is 0 or 1;

K is $(CR^6R^7)_z$;

J is $(CR^6R^7)_y$; wherein:

R^6 and R^7 are independently hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4) alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio or amino;

R^5 is hydrogen, a conjugate, (C_1-C_6) alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C_1-C_6) alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

l is an integer from 1 to 5; and

at least one of L and R^3 comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a

cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;

wherein said conjugate optionally includes a linking moiety; and

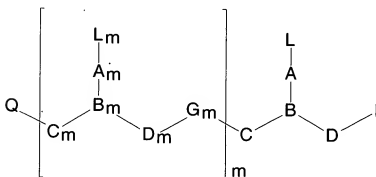
wherein said group R^3 is a conjugate.

50 (canceled)

51. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein one of Q or I comprises a conjugate, wherein said conjugate is polylysine.

52. (previously presented) A peptide nucleic acid conjugate of claim 53 wherein one of A, A_m , L or L_m comprises a conjugate, wherein said conjugate is polylysine.

53. (previously presented) A peptide nucleic acid conjugate of the formula:



wherein:

m is an integer from 1 to about 50;

L and L_m independently are $R^{12}(R^{13})_a$ wherein:

R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate;

provided that at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate;

provided at least one R^{12} and R^{13} is a conjugate; and

a is 0 or 1;

C and C_m independently are $(CR^6R^7)_y$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4 , SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

wherein R^5 is hydrogen, a conjugate, (C_1-C_6) alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C_1-C_6) alkyl; and

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4) alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio or amino;

D and D_m independently are $(CR^6R^7)_z$;

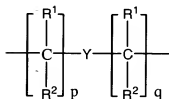
each of y and z is zero or an integer from 1 to 10, wherein the sum $y + z$ is greater than 2 but not more than 10;

G_m is independently $-NR^3CO-$, $-NR^3CS-$, $-NR^3SO-$, or $-NR^3SO_2-$ in either orientation;

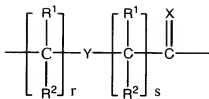
each pair of $A-A_m$ and $B-B_m$ are selected such that:

(a) A or A_m is a group of formula (IIa), (IIb) or (IIc) and B or B_m is N or R^3N+ ; or

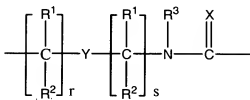
(b) A or A_m is a group of formula (IId) and B or B_m is CH;



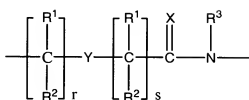
IIa



IIb



IIc



IId

where:

X is O, S, Se, NR³, CH₂ or C(CH₃)₂;

Y is a single bond, O, S or NR⁴;

each of p and q is zero or an integer from 1 to 5;

each of r and s is zero or an integer from 1 to 5;

R¹ and R² independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

I is -NR⁸R⁹ or -NR¹⁰C(O)R¹¹; wherein:

R⁸, R⁹, R¹⁰ and R¹¹ independently are hydrogen, alkyl, an amino protecting group, a reporter ligand, an intercalator, a chelator, a peptide, a protein, a carbohydrate, a lipid, a steroid, a nucleoside, a nucleotide, a nucleotide diphosphate, a nucleotide triphosphate, an oligonucleotide, an oligonucleoside, a soluble polymer, a non-soluble polymer or a conjugate;

Q is -CO₂H, -CO₂R⁸, -CO₂R⁹, -CONR⁸R⁹, -SO₃H, -SO₂NR¹⁰R¹¹ or an activated derivative of -CO₂H or -SO₃H; and

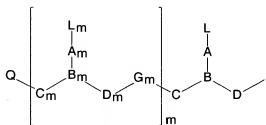
wherein:

at least one of Q and I comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A, A_m , L, and L_m comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;

wherein said conjugate optionally includes a linking moiety.

54. (previously presented) A peptide nucleic acid conjugate of the formula:



wherein:

m is an integer from 1 to about 50;

L and L_m independently are $R^{12}(R^{13})_a$ wherein:

R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate;

provided that at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

a is 0 or 1;

C and C_m independently are $(CR^6R^7)_y$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6)

alkylthio, a conjugate, NR^3R^4 , SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

wherein R^5 is hydrogen, a conjugate, $(\text{C}_1\text{-C}_6)\text{alkyl}$, hydroxy-, alkoxy-, or alkylthio-substituted $(\text{C}_1\text{-C}_6)\text{alkyl}$; and

R^3 and R^4 independently are hydrogen, a conjugate, $(\text{C}_1\text{-C}_4)\text{alkyl}$, hydroxy- or alkoxy- or alkylthio-substituted $(\text{C}_1\text{-C}_4)\text{alkyl}$, hydroxy, alkoxy, alkylthio or amino;

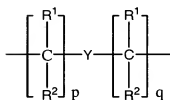
D and D_m independently are $(\text{CR}^6\text{R}^7)_z$;

each of y and z is zero or an integer from 1 to 10, wherein the sum $y + z$ is greater than 2 but not more than 10;

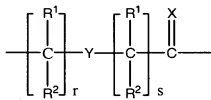
G_{iii} is independently $-\text{NR}^3\text{CO}-$, $-\text{NR}^3\text{CS}-$, $-\text{NR}^3\text{SO}-$, or $-\text{NR}^3\text{SO}_2-$ in either orientation;

each pair of A- A_m and B- B_m are selected such that:

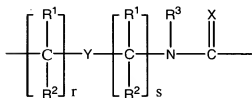
- (a) A or A_m is a group of formula (IIa), (IIb) or (IIc) and B or B_m is N or R^3N^+ ; or
- (b) A or A_m is a group of formula (IIId) and B or B_m is CH;



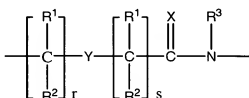
IIa



IIb



IIc



IIId

wherein:

X is O, S, Se, NR^3 , CH_2 or $\text{C}(\text{CH}_3)_2$;

Y is a single bond, O, S or NR^4 ;

each of p and q is zero or an integer from 1 to 5;

each of r and s is zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C_1-C_4) alkyl, hydroxy-substituted (C_1-C_4) alkyl, alkoxy-substituted (C_1-C_4) alkyl, alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

I is $-NR^8R^9$ or $-NR^{10}C(O)R^{11}$; wherein:

R^8 , R^9 , R^{10} and R^{11} independently are hydrogen, alkyl, an amino protecting group, a reporter ligand, an intercalator, a chelator, a peptide, a protein, a carbohydrate, a lipid, a steroid, a nucleoside, a nucleotide, a nucleotide diphosphate, a nucleotide triphosphate, an oligonucleotide, an oligonucleoside, a soluble polymer, a non-soluble polymer or a conjugate;

Q is $-CO_2H$, $-CO_2R^8$, $-CO_2R^9$, $-CONR^8R^9$, $-SO_3H$, $-SO_2NR^{10}R^{11}$ or an activated derivative of $-CO_2H$ or $-SO_3H$; and

wherein:

at least one of Q and I comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A, A_m , L, and L_m comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;

wherein said conjugate optionally includes a linking moiety; and

wherein at least one of R^1 , R^2 or R^3 is a conjugate.

Chemical structure diagram of a polycondensate repeat unit. The structure shows a chain of atoms: Q-C_m-B_m-D_m-G_m-C-B-D. Above B_m is A_m, and above A_m is L_m. Above C is L, and above L is A. The entire chain is enclosed in brackets with a subscript 'm' at the bottom right.

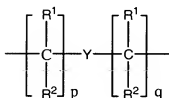
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each of y and z is zero or an integer from 1 to 10, wherein the sum y + z is greater than 2 but not more than 10;

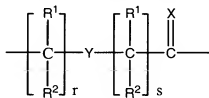
G_m is independently $-NR^3CO-$, $-NR^3CS-$, $-NR^3SO-$, or $-NR^3SO_2-$ in either orientation;

each pair of $A-A_m$ and $B-B_m$ are selected such that:

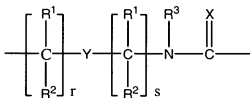
- (a) A or A_m is a group of formula (IIa), (IIb) or (IIc) and B or B_m is N or R^3N^+ ; or
- (b) A or A_m is a group of formula (IIa) and B or B_m is CH_3 ;



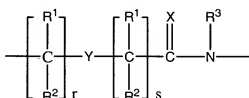
IIa



IIb



IIc



IId

wherein:

X is O , S , Se , NR^3 , CH_2 or $C(CH_3)_2$;

Y is a single bond, O , S or NR^4 ;

each of p and q is zero or an integer from 1 to 5;

each of r and s is zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C_1-C_4) alkyl, hydroxy-substituted (C_1-C_4) alkyl, alkoxy-substituted (C_1-C_4) alkyl, alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

I is $-NR^8R^9$ or $-NR^{10}C(O)R^{11}$; wherein:

R^8 , R^9 , R^{10} and R^{11} independently are hydrogen, alkyl, an amino protecting group, a reporter ligand, an intercalator, a chelator, a peptide, a protein, a carbohydrate, a lipid, a steroid, a nucleoside, a nucleotide, a nucleotide diphosphate, a nucleotide triphosphate, an oligonucleotide, an oligonucleoside, a soluble polymer, a non-soluble polymer or a conjugate;

Q is $-\text{CO}_2\text{H}$, $-\text{CO}_2\text{R}^8$, $-\text{CO}_2\text{R}^9$, $-\text{CONR}^8\text{R}^9$, $-\text{SO}_3\text{H}$, $-\text{SO}_2\text{NR}^{10}\text{R}^{11}$ or an activated derivative of $-\text{CO}_2\text{H}$ or $-\text{SO}_3\text{H}$; and

wherein:

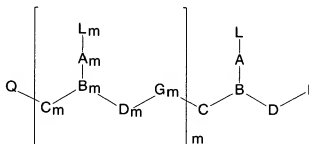
at least one of Q and I comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A, A_m , L, and L_m comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;

wherein said conjugate optionally includes a linking moiety; and

wherein at least one of R^8 , R^9 , R^{10} and R^{11} is a conjugate.

56. (previously presented) A peptide nucleic acid conjugate of the formula:



wherein:

m is an integer from 1 to about 50;

L and L_m independently are $\text{R}^{12}(\text{R}^{13})_n$ wherein:

R^{12} is hydrogen, hydroxy, $(\text{C}_1\text{-C}_4)$ alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate;

provided that at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

a is 0 or 1;

C and C_m independently are $(CR^6R^7)_y$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6) alkylthio, a conjugate, NR^3R^4 , SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

wherein R^5 is hydrogen, a conjugate, (C_1-C_6) alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C_1-C_6) alkyl; and

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4) alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio or amino;

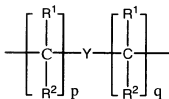
D and D_m independently are $(CR^6R^7)_z$;

each of y and z is zero or an integer from 1 to 10, wherein the sum y + z is greater than 2 but not more than 10;

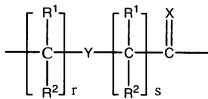
G_m is independently $-NR^3CO-$, $-NR^3CS-$, $-NR^3SO-$, or $-NR^3SO_2-$ in either orientation;

each pair of A- A_m and B- B_m are selected such that:

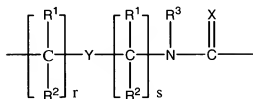
- (a) A or A_m is a group of formula (IIa), (IIb) or (IIc) and B or B_m is N or R^3N^+ ; or
- (b) A or A_m is a group of formula (IIId) and B or B_m is CH;



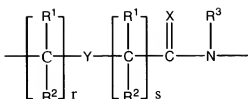
IIa



IIb



Iic



IId

wherein:

X is O, S, Se, NR³, CH₂ or C(CH₃)₂;

Y is a single bond, O, S or NR⁴;

each of p and q is zero or an integer from 1 to 5;

each of r and s is zero or an integer from 1 to 5;

R¹ and R² independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

I is -NR⁸R⁹ or -NR¹⁰C(O)R¹¹; wherein:

R⁸, R⁹, R¹⁰ and R¹¹ independently are hydrogen, alkyl, an amino protecting group, a reporter ligand, an intercalator, a chelator, a peptide, a protein, a carbohydrate, a lipid, a steroid, a nucleoside, a nucleotide, a nucleotide diphosphate, a nucleotide triphosphate, an oligonucleotide, an oligonucleoside, a soluble polymer, a non-soluble polymer or a conjugate;
 Q is -CO₂H, -CO₂R⁸, -CO₂R⁹, -CONR⁸R⁹, -SO₃H, -SO₂NR¹⁰R¹¹ or an activated derivative of -CO₂H or -SO₃H; and

wherein:

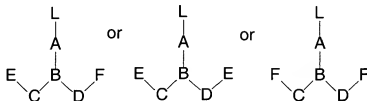
at least one of Q and I comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A, A_m, L, and L_m comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers;

wherein said conjugate optionally includes a linking moiety; and

wherein at least one of R³, R⁴, R⁵, R⁶ and R⁷ is a conjugate.

57. (previously presented) A peptide nucleic acid conjugate comprising a plurality of monomers of formula:



wherein:

L is $\text{R}^{12}(\text{R}^{13})_a$; wherein:

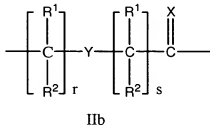
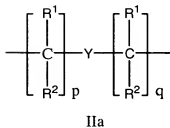
R^{12} is hydrogen, hydroxy, $(\text{C}_1\text{-C}_4)$ alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

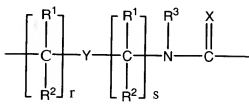
R^{13} , if present, is a conjugate; and

a is 0 or 1;

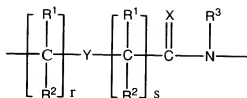
A and B are selected such that:

- (a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+ ; or
- (b) A is a group of formula (IId) and B is CH;





IId



IId

where:

X is O, S, Se, NR^3 , CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4 ;

p and q independently are zero or an integer from 1 to 5;

r and s independently are zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is $(CR^6R^7)_y$;

D is $(CR^6R^7)_z$, wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C₁-C₄)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio or amino; and

R^5 is hydrogen, a conjugate, (C₁-C₆)alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C₁-C₆)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

E independently is COOH, CSOH, SOOH, SO₂OH or an activated or protected derivative thereof;

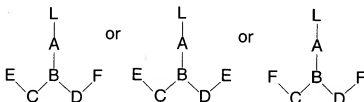
F independently is NHR^3 or $NPgR^3$, where Pg is an amino protecting group; or F comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A and L comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and

wherein said conjugate optionally includes a linking moiety; and

wherein at least one group R^3 is a conjugate.

58. (previously presented) A peptide nucleic acid conjugate comprising a plurality of monomers of formula:



wherein:

L is $R^{12}(R^{13})_a$, wherein:

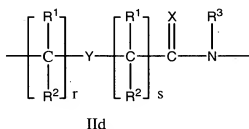
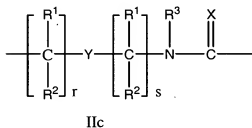
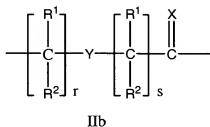
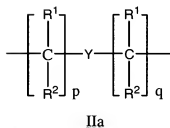
R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

a is 0 or 1;

A and B are selected such that:

- (a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+ ; or
 (b) A is a group of formula (IIId) and B is CH;



where:

X is O, S, Se, NR^3 , CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4 ;

p and q independently are zero or an integer from 1 to 5;

r and s independently are zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is $(CR^6R^7)_i$;

D is $(CR^6R^7)_z$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C_1-C_4) alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio or amino; and

R^5 is hydrogen, a conjugate, (C_1-C_6) alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C_1-C_6) alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

E independently is COOH, CSOH, SOOH, SO₂OH or an activated or protected derivative thereof;

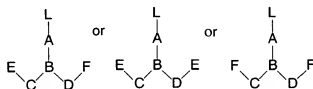
F independently is NHR^3 or $NPgR^3$, where Pg is an amino protecting group; or F comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A and L comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and

wherein said conjugate optionally includes a linking moiety; and

wherein at least one of said groups A or said groups B include a conjugate.

59. (previously presented) A peptide nucleic acid conjugate comprising a plurality of monomers of formula:



wherein:

L is $R^{12}(R^{13})_a$; wherein:

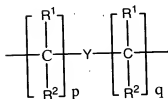
R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

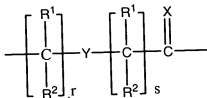
a is 0 or 1;

A and B are selected such that:

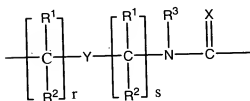
- (a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+ ; or
- (b) A is a group of formula (IIId) and B is CH;



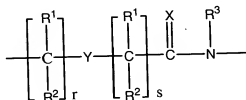
IIa



IIb



IIc



IIId

where:

X is O, S, Se, NR^3 , CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4 ;

p and q independently are zero or an integer from 1 to 5;

r and s independently are zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is (CR⁶R⁷)_y;

D is (CR⁶R⁷)_z; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR³R⁴ and SR⁵ or R⁶ and R⁷ taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C₁-C₄)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio or amino; and

R^5 is hydrogen, a conjugate, (C₁-C₆)alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C₁-C₆)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

E independently is COOH, CSOH, SOOH, SO₂OH or an activated or protected derivative thereof;

F independently is NHR³ or NPgR³, where Pg is an amino protecting group; or

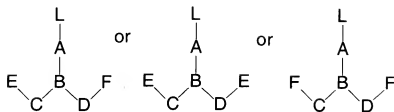
F comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or

at least one of A and L comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and

wherein said conjugate optionally includes a linking moiety; and

wherein at least one of group R¹ or group R² is a conjugate.

60. (previously presented) A peptide nucleic acid conjugate comprising a plurality of monomers of formula:



wherein:

L is $\text{R}^{12}(\text{R}^{13})_a$; wherein:

R^{12} is hydrogen, hydroxy, $(\text{C}_1\text{-C}_4)$ alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

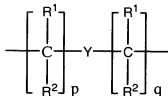
R^{13} , if present, is a conjugate; and

a is 0 or 1;

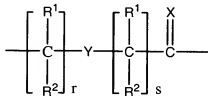
A and B are selected such that:

(a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+ ; or

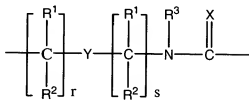
(b) A is a group of formula (IIa) and B is CH;



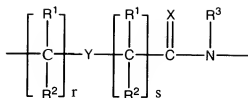
IIa



IIb



IIc



IId

where:

X is O, S, Se, NR³, CH₂ or C(CH₃)₂;

Y is a single bond, O, S or NR⁴;

p and q independently are zero or an integer from 1 to 5;

r and s independently are zero or an integer from 1 to 5;

R¹ and R² independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is (CR⁶R⁷)_y;

D is (CR⁶R⁷)_z; wherein:

R⁶ and R⁷ independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR³R⁴ and SR⁵ or R⁶ and R⁷ taken together complete an alicyclic or heterocyclic system;

R³ and R⁴ independently are hydrogen, a conjugate, (C₁-C₄)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio or amino; and

R⁵ is hydrogen, a conjugate, (C₁-C₆)alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C₁-C₆)alkyl;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

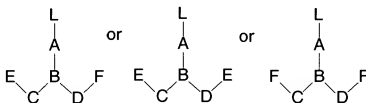
E independently is COOH, CSOH, SOOH, SO₂OH or an activated or protected derivative thereof;

F independently is NHR³ or NPgR³, where Pg is an amino protecting group; or

F comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, or a porphyrin; or

at least one of A and L comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and wherein said conjugate optionally includes a linking moiety; and wherein at least one of R^3 , R^4 , R^5 , R^6 , and R^7 is a conjugate.

61. (previously presented) A peptide nucleic acid conjugate comprising a plurality of monomers of formula:



wherein:

L is $R^{12}(R^{13})_a$; wherein:

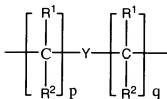
R^{12} is hydrogen, hydroxy, (C_1-C_4) alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R^{12} is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

R^{13} , if present, is a conjugate; and

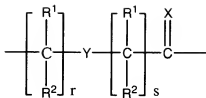
a is 0 or 1;

A and B are selected such that:

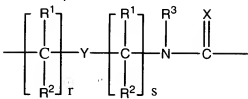
- (a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+ ; or
- (b) A is a group of formula (IId) and B is CH;



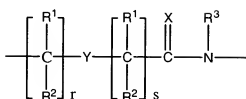
IIa



IIb



IIc



IId

where:

X is O, S, Se, NR^3 , CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4 ;

p and q independently are zero or an integer from 1 to 5;

r and s independently are zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C₁-C₄)alkyl, hydroxy-substituted (C₁-C₄)alkyl, alkoxy-substituted (C₁-C₄)alkyl, alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is $(CR^6R^7)_z$;

D is $(CR^6R^7)_z$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C₂-C₆) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C₁-C₆) alkoxy, (C₁-C₆) alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, (C₁-C₄)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C₁-C₄)alkyl, hydroxy, alkoxy, alkylthio or amino; and

R^5 is hydrogen, a conjugate, (C₁-C₆)alkyl, hydroxy-, alkoxy-, or alkylthio-substituted (C₁-C₆)alkyl;

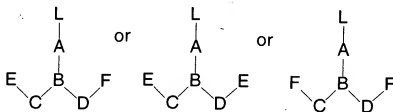
each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

E independently is COOH, C₂SOH, SOOH, SO₂OH or an activated or protected derivative thereof;

F independently is NHR³ or NPgR³, where Pg is an amino protecting group; or F comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, a porphyrin, or an alkylator; or at least one of A and L comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, an alkylator, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and wherein said conjugate optionally includes a linking moiety; and

wherein at least one of said groups C or said groups D include a conjugate.

62. (previously presented) A peptide nucleic acid conjugate comprising a plurality of monomers of formula:



wherein:

L is R¹²(R¹³)_a; wherein:

R¹² is hydrogen, hydroxy, (C₁-C₄)alkanoyl, a naturally occurring nucleobase, a non-naturally occurring nucleobase, an aromatic moiety, a DNA intercalator, a nucleobase-binding group, a heterocyclic moiety, a reporter ligand, or a conjugate and at least one of R¹² is a naturally occurring nucleobase, a non-naturally occurring nucleobase, or a nucleobase-binding group;

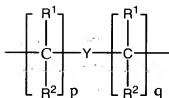
R^{13} , if present, is a conjugate; and

a is 0 or 1;

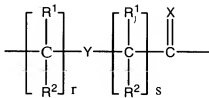
A and B are selected such that:

(a) A is a group of formula (IIa), (IIb) or (IIc) and B is N or R^3N^+ ; or

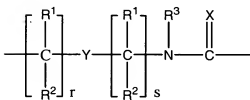
(b) A is a group of formula (IId) and B is CH;



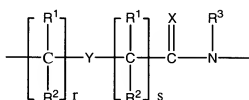
IIa



IIb



IIc



IId

where:

X is O, S, Se, NR^3 , CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4 ;

p and q independently are zero or an integer from 1 to 5;

r and s independently are zero or an integer from 1 to 5;

R^1 and R^2 independently are hydrogen, (C_1-C_4) alkyl, hydroxy-substituted (C_1-C_4) alkyl, alkoxy-substituted (C_1-C_4) alkyl, alkylthio-substituted (C_1-C_4) alkyl, hydroxy, alkoxy, alkylthio, amino, halogen or a conjugate;

C is $(CR^6R^7)_y$;

D is $(CR^6R^7)_z$; wherein:

R^6 and R^7 independently are hydrogen, a side chain of a naturally occurring alpha amino acid, (C_2-C_6) alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6) alkoxy, (C_1-C_6)

alkylthio, a conjugate, NR^3R^4 and SR^5 or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

R^3 and R^4 independently are hydrogen, a conjugate, $(\text{C}_1\text{-C}_4)\text{alkyl}$, hydroxy- or alkoxy- or alkylthio-substituted $(\text{C}_1\text{-C}_4)\text{alkyl}$, hydroxy, alkoxy, alkylthio or amino; and

R^5 is hydrogen, a conjugate, $(\text{C}_1\text{-C}_6)\text{alkyl}$, hydroxy-, alkoxy-, or alkylthio-substituted $(\text{C}_1\text{-C}_6)\text{alkyl}$;

each of y and z is zero or an integer from 1 to 10, the sum y + z being greater than 2 but not more than 10;

E independently is COOH , CSOH , SOOH , SO_2OH or an activated or protected derivative thereof;

F independently is NHR^3 or NPgR^3 , where Pg is an amino protecting group;

or

F comprises a conjugate selected from a terpene, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, or a porphyrin; or

at least one of A and L comprises a conjugate selected from a reporter enzyme, a reporter molecule, a steroid, a carbohydrate, a terpene, a peptide, a protein, a phospholipid, a cell receptor binding molecule, a water soluble vitamin, a lipid soluble vitamin, an RNA/DNA cleaving complex, a metal chelator, a porphyrin, or a polymeric compound selected from polymeric amines, polymeric glycols and polyethers; and

wherein said conjugate optionally includes a linking moiety.